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(58) Field of search

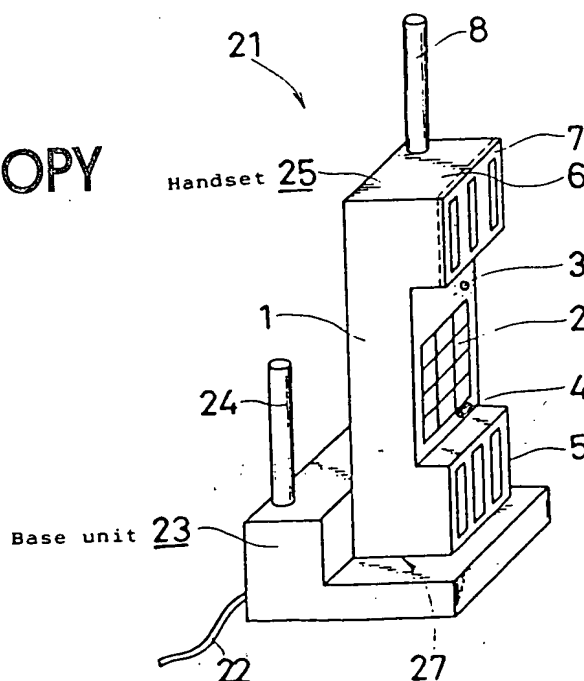
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(54) Cordless telephone

(57) A battery-powered cordless telephone comprising a base-unit 23 in radio communication with a handset 25 and having a display 3 to indicate the in-service state of the equipment has means for detecting the use of the equipment in order to switch off the display while the handset is actually in use, to conserve battery power. The detector may be a contact sensor or a speech sensor.

Fig 1



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Fig 1

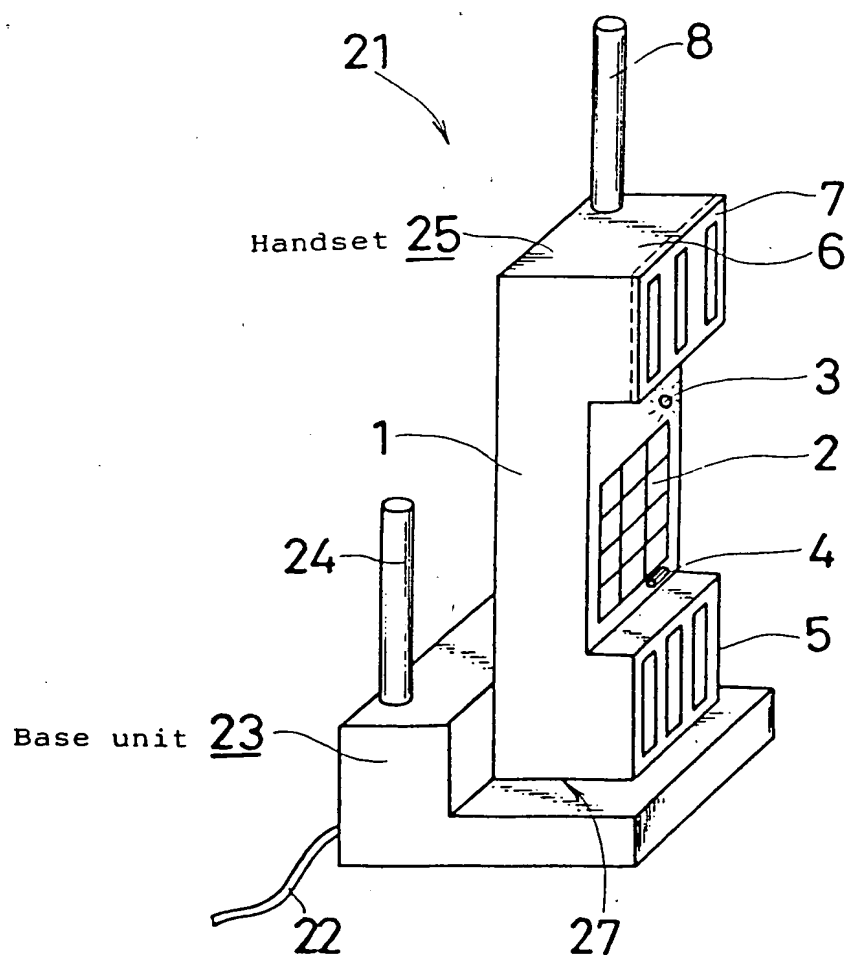


Fig. 2

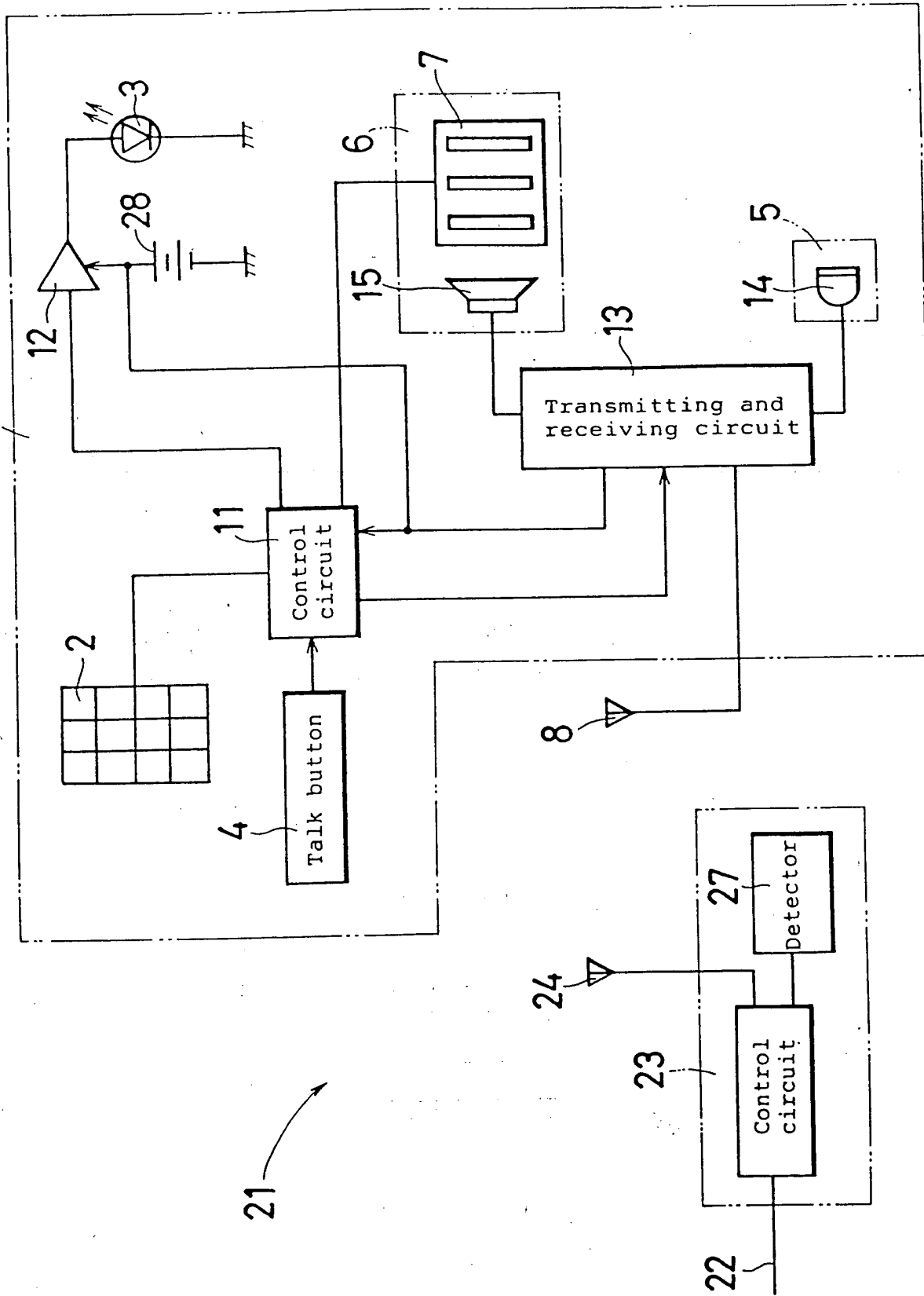


Fig. 3

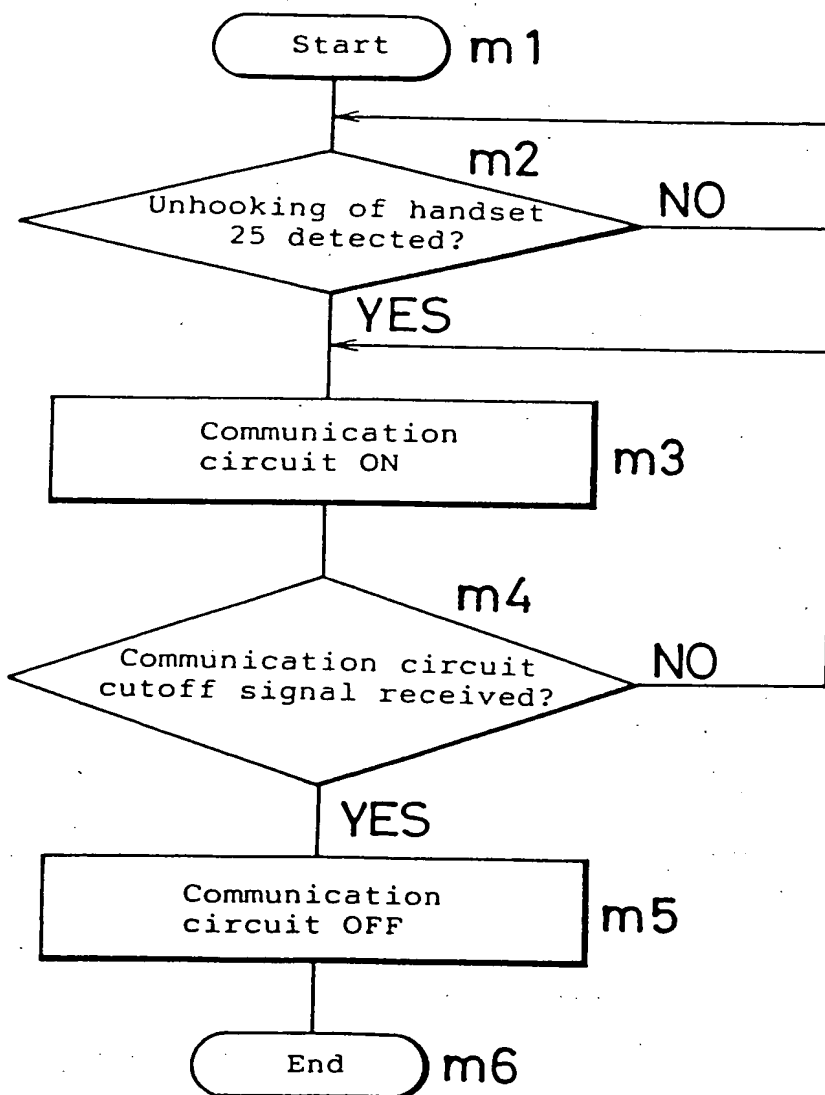
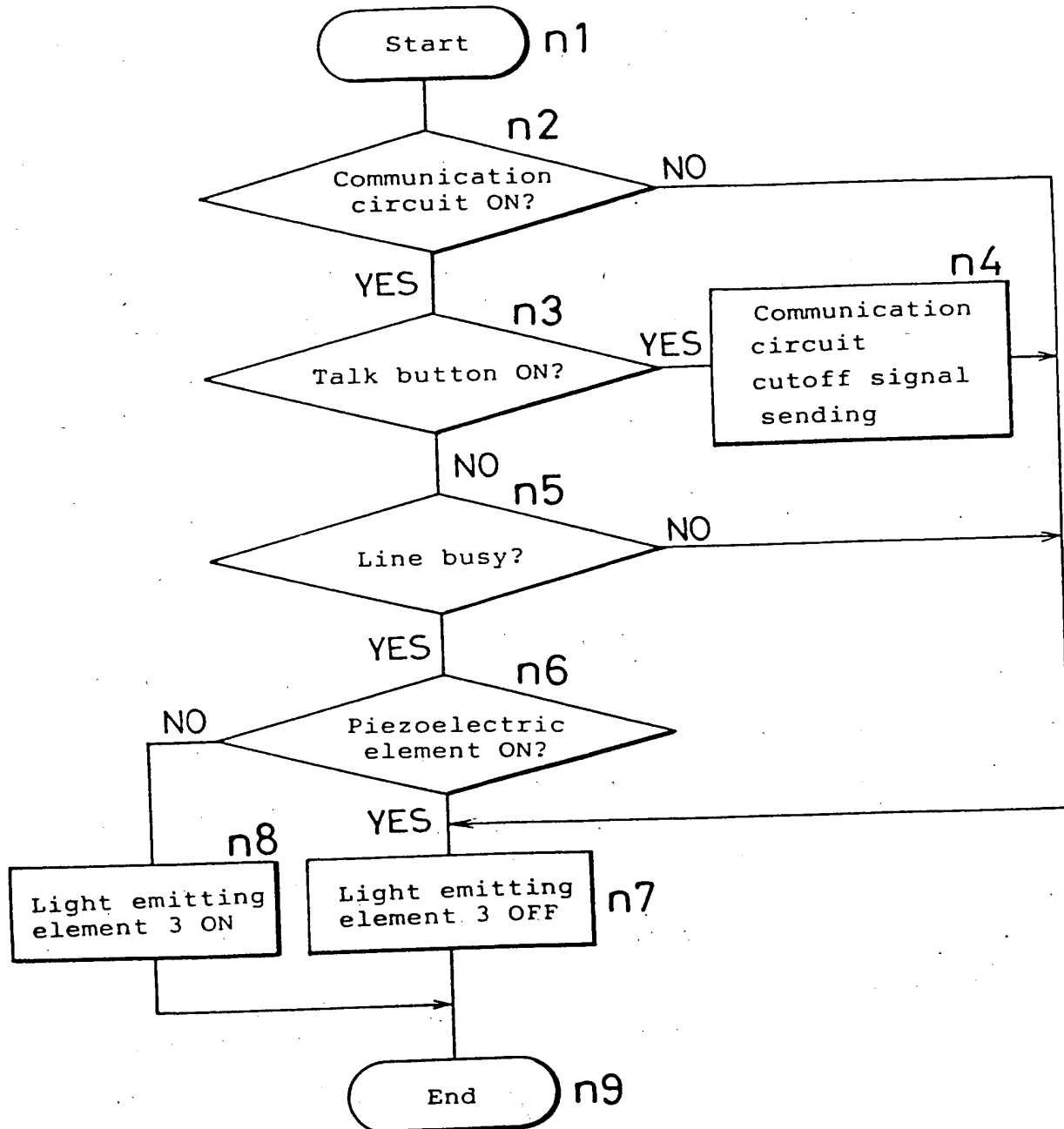


Fig. 4



## SPECIFICATION

## TITLE OF THE INVENTION

## CORDLESS TELEPHONE

## BACKGROUND OF THE INVENTION

## 1. Field of the Invention

The present invention relates to a cordless telephone having a base unit connected to a communication line such as telephone line, and a handset connected to the base unit by radio communication and furnished with means for display so as to indicate while the handset is in service.

## 2. Description of the Prior Art

In the conventional telephone, the service can be directly recognized by lifting the handset off the cradle, and the end of call can be confirmed directly by putting back the handset on the cradle. In the cordless telephone which is recently spreading, however, the handset is often placed at a distance from the base unit. In this case, therefore, the end of call by the handset cannot be confirmed in the conventional method, and in the hitherto cordless telephone, a pilot lamp is built in the handset as the means for display, and this lamp is being lit while the handset is in service, and by pressing the call button on the handset after the call, the pilot lamp goes out.

In such conventional cordless telephone, the pilot lamp is usually located near the call button (input key), and it is not visible at all by the user if the speaker area of the handset is fitted to the ear. Accordingly, it is quite meaningless to light up the pilot lamp always during call by the handset, and only the battery is spent purposelessly.

#### SUMMARY OF THE INVENTION

It is hence a primary object of the invention to present a novel cordless telephone capable of, by solving the above technical problems, stopping the display action by the display means while the handset is in service so as to minimize the wasteful consumption of the electric power supplied from the battery or the like.

To achieve the above object, the cordless telephone of the invention comprises:

(a) a base unit connected to a telephone line so as to communicate by radio waves for talking, and

(b) a handset comprising:

(b1) a speaker,

(b2) a microphone,

(b3) a transmitting and receiving circuit for communicating with the base unit by radio waves, transforming the signals from the caller into acoustic sound by the speaker, and sending the output from the microphone to the caller, and



(b4) a battery for providing the transmitting and receiving circuit with electric power, wherein

(c) the handset further comprises:

(c1) means for display to indicate the in-service state,

(c2) means for detecting the contact of the speaker area with a part of the body,

(c3) means for detecting the talk to detect the in-service state, and

(c4) means for controlling to stop the display action of the display means when the speaker area is in contact with a part of the body and is in service, in response to the output from the contact detecting means and talk detecting means, and to effect the display action by the display means while the speaker area is not in contact with the body during service, and

(c5) the handset is electrically powered by the battery.

Preferably, the display means is a light emitting diode.

Also preferably, the contact detecting means is a piezoelectric element.

Further preferably, the handset is provided with means for dial input, and the controlling means generates a dial signal in response to the output of this dial input means so as to call the partner by the base unit.

More preferably, the contact detecting means has a

penetration hole, and the speaker is disposed behind this contact detecting means.

The invention also relates to a cordless telephone having a base unit connected to a telephone line and a handset connected to the base unit through radio communication and equipped with means for display so as to indicate the in-service state by the handset by the display means, which comprises:

means for detecting contact when a part of the body of the user contacts with the speaker area, and

means for stopping the display to stop the display action by the display means when a part of the body of the user is in contact with the speaker area of the handset, in response to the detection signal from the contact detecting means.

According to the invention, when the contact of a part of the body of the user with the speaker area of the handset is detected by the contact detecting means, the display action of the display means is stopped by the display stopping means while a part of the body of the user is in contact with the speaker area of the handset. When the part of the body of the user is departed from the speaker area of the handset, the display action of the display means is effected again.

Thus, according to the cordless telephone of the invention, while talking, as far as a part of the body of the user remains in contact with the speaker area of

the handset, the display action by the display means is effective to tell the in-service state, so that the consumption of the battery while the handset is in service can be minimized.

#### BRIEF DESCRIPTION OF THE DRAWINGS

These and other objects of the invention, as well as the features and advantages thereof, will be better understood and appreciated from the following detailed description taken in conjunction with the drawings.

FIG. 1 is a perspective view showing the entire structure of a cordless telephone in one of the embodiments of the invention,

FIG. 2 is a block diagram showing a schematic electrical structure of the cordless telephone in FIG. 1,

FIG. 3 is a flow chart for explaining the operation of a base unit 23, and

FIG. 4 is a flow chart for explaining the operation of a handset 1.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings, one of the preferred embodiments of the invention is described in details below.

FIG. 1 is a perspective view showing the entire structure of a cordless telephone 21 according to an embodiment of the

invention. The cordless telephone 21 is connected to a telephone line 22, and comprises a handset 25 and a base unit 23 for radio communication therewith, and the base unit 23 has an antenna 24 for radio communication with the handset 25. The handset 25 comprises key switches 2 such as numeric keys as dial input means provided inside the grip of a handset unit 1, a light emitting element 3 as display means composed of a light emitting diode (LED) or the like disposed in the vicinity of the key switches 2 inside the grip, a talk button 4 as the talk stopping means for changing over between line capturing state and talk waiting state, a transmitter 5 with a microphone 14 built in and located near the mouth of the user, a receiver 6 containing a piezoelectric element 7 known as touch sensor or the like as the contact detecting means when contacting with the ear, that is, a part of the body of the user while talking, an antenna 8 for communicating with the base unit 23, and a battery 28.

FIG. 2 is a block diagram showing a schematic electrical construction of the cordless telephone 21.

In this diagram, a key signal by the operation of the key switch 2 is given to a control circuit 11 which is means for controlling the members in the handset 25, and is also sent out from the antenna 8 through a transmitting and receiving circuit 13, and is received through the antenna 24 of the base unit 23, and is sent out to the telephone

at the destination through the telephone line 22. Besides, by the key signal from the key switch 2, the control circuit 11 sends out a drive signal to a driver 12 for lighting up the light emitting element 3, and the driver 12 is driven to light up the light emitting element 3. In the meantime, a signal from the piezoelectric element 7 is applied to the control circuit 11, and a stop signal is sent out to the driver 12 by a signal from this piezoelectric element 7, and driving of the driver 12 is stopped to put out the light emitting element 3. At the same time, the control circuit 11 sends out a control signal to the transmitting and receiving circuit 13. The transmitting and receiving circuit 13 amplifies and modulates the transmission signal entered from a microphone 14 built in the transmitter 5, and sends out from the antenna 8, and demodulates and amplifies the reception signal sent from the base unit 23 through the telephone line 22 which is a communication circuit, and sends out to a speaker 15 built in the receiver 6, so that an acoustic signal is delivered from the speaker 15. Such handset 25 is electrically powered by a built-in battery 28.

Referring then to FIG. 3 and FIG. 4, the talking action of the base unit 23 and handset 25 is described below. First, at step n1 in FIG. 3, the talking action is started, and the handset 25 is unhooked from the base unit 23 by the caller at step n2, when it is detected by the handset unhook

detecting switch 27.

At step n1 in FIG. 4, when the key switch 2 is operated and the telephone circuit 22 is connected at step n2, a drive signal is issued from the control circuit 11 to the driver 12, and when the talk button 4 is not pressed at step n3, the operation goes to step n5, and when the line is busy, the operation advances to step n6, and when the receiver 6 is not in contact with the user's ear, the light emitting element 3 lights up at step n8. In this state, when the user touches the receiver 6 of the handset by the ear, it is detected by the piezoelectric element 7, and the detection signal is sent out to the control circuit 11. The control circuit 11 on the basis of this detection signal, sends out a stop signal to the driver 12, and driving of the driver 12 is stopped, and the light emitting element 3 is put out at step n7. Afterwards, when the user's ear is departed again from the piezoelectric element 7, the control circuit 11 then sends out a drive signal to the driver 12 to drive the driver 12, thereby lighting the light emitting element 3 again. Afterwards, by pressing the talk button 4 at step n3, a communication circuit cut-off signal is sent out from the handset 25 to the base unit 23 at step n4, and the base unit 23 receives the communication circuit signal at step m4 in FIG. 3, and the connection with the telephone line 22 is cut off at step m5, so that the light emitting element 3 of the handset 25

goes out.

In this way, while the handset 25 is in service, the light emitting element 3 is being put out, and the consumption of the battery 28 can be considerably reduced.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiments are therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description and all changes which come within the meaning and the range of equivalency of the claims are therefore intended to be embraced therein.

CLAIMS:

1. A cordless telephone comprising:

(a) a base unit (23) connected to a telephone line (22) so as to communicate by radio waves for talking, and

(b) a handset (25) comprising:

(b1) a speaker (15),

(b2) a microphone (14),

(b3) a transmitting and receiving circuit (13) for communicating with the base unit (23) by radio waves, transforming the signals from the caller into acoustic sound by the speaker (15), and sending the output from the microphone (14) to the caller, and

(b4) a battery (28) for providing the transmitting and receiving circuit with electric power, wherein

(c) the handset (25) further comprises:

(c1) means (3) for display to indicate the in-service state,

(c2) means (7) for detecting the contact of the speaker area with a part of the body,

(c3) means (27) for detecting the talk to detect the in-service state, and

(c4) means (11) for controlling to stop the display action of the display means (3) when the speaker area is in contact with a part of the body and is in service, in response to the output from the contact detecting means (7)



and talk detecting means (27), and to effect the display action by the display means (13) while the speaker area is not in contact with the body during service, and

(c5) the handset (25) is electrically powered by the battery (28).

2. A cordless telephone according to claim 1, wherein the display means (3) is a light emitting diode.

3. A cordless telephone according to claim 1, wherein the contact detecting means (7) is a piezoelectric element.

4. A cordless telephone according to claim 1, wherein the handset (25) comprises means (2) for dial input, and the control means (11) generates a dial signal in response to the output of the dial input means (2) to call the partner by the base unit (23).

5. A cordless telephone according to claim 1, wherein the contact detecting means (7) has a penetration hole, and the speaker is disposed behind this contact detecting means (7).

6. A cordless telephone having a base unit connected to a telephone line (22) and a handset (25) connected to the base unit (23) through radio communication and equipped with means (3) for display so as to indicate the in-service state by the handset (25) by the display means (3), which comprises:

means (7) for detecting contact when a part of the body

of the user contacts with the speaker area, and

means (11) for stopping the display to stop the display action by the display means (3) when a part of the body of the user is in contact with the speaker area of the handset (25), in response to the detection signal from the contact detecting means (7).

7. A cordless telephone comprising a base unit which includes means for connection to a telephone line, and a battery-powered handset adapted for radio communication with the base unit, the handset having electrically operated means for indicating to the user an in-service condition thereof, means for detecting in-service use of the handset and means for switching off the indicating means in response to detection by said detecting means of said in-service use, thereby to conserve battery power.

8. A cordless telephone substantially as hereinbefore described with reference to the accompanying drawings.